of the OB supergiants δ , ϵ , and ζ Orionis. The lines are shifted towards shorter wavelengths by 1000 to 2000 km sec⁻¹, indicating high-velocity mass ejection. The N v and S iv lines are sufficiently unsaturated that Doppler velocities and column densities can be determined from the central depths and equivalent widths. A simple model is adopted in which the lines are formed in a region of constant velocity, and the ionization results from the dilute radiation of the star. The observed ion densities, along with reasonable assumptions for the electron temperature and stellar radius, fix the state of ionization in the shell and the rate of mass loss, which is found to be about $10^{-6} M_{\odot} \text{ yr}^{-1}$ for each star.

Recent Photometry of Novalike Variables.

GEORGE S. MUMFORD, *Tufts University*.—Preliminary results of photoelectric observations made at Kitt Peak National Observatory during February 1967 are presented.

T Leo appears to be another quite blue dwarf nova, $B - V = -0.07$, that is also a strong ultraviolet radiator, $U - B = -1.06$, with pronounced flickering.

Light curves of Cn Ori on two nights show extreme humps that are reminiscent of VV Pup.

Minima of Nova T Aur observed on three nights are best reconciled with those of Walker (*Astrophys. J.* **138**, 313, 1963) through the light elements:

Minimum = Hel. JD 2437614.011 + 0^d2043786E.

Coronal Polar Plumes. GORDON NEWKIRK, JR., AND JOHN HARVEY, *High Altitude Observatory*.—The autocorrelations and frequency spectra of the radiance of the polar corona observed during the three eclipses of the last sunspot minimum are examined. It is found that the width of polar plumes is 3.4×10^4 km, in agreement with earlier determinations, and that only marginal periodicity in the spacing of plumes is present.

Statistical data supporting a connection between polar plume and polar faculae, bright K_3 facula, and supergranulation cells are discussed. Our analysis shows that the observed properties of plumes are consistent with the hypothesis that these features are the result of the increased flux of material into the corona from the small-scale magnetic field concentrations which are centered on the chromospheric rosette. At sunspot minimum only a small fraction of the polar rosettes possess polar plumes while at sunspot maximum and at low latitudes it appears that every rosette supports a plume.

On the Density Gradient at the Fringe of the Convective Zone. MINORU NISHIDA, *Kyoto Univer-*

sity, AND ALAN M. SCHINDLER, *Brandeis University*.—Near the surface of a star high opacity steepens the temperature gradient and causes the outer layers to become unstable against convection. There is some question as to whether this steep temperature gradient produces an inversion of the density gradient, i.e., $d \ln \rho / d \ln T$ negative over some portion of the outer convective zone. In a recent paper (Chitre and Shaviv, *Proc. N.A.S.* **57**, 573, 1967) the density gradient is computed by constructing a model in which a fixed fraction of the energy flux is transported by convection. The result is an inversion of the density gradient in all cases computed. Mixing length theory is not used.

In this paper it is shown that, if an appropriate choice is made for a mixing length, no inversion of the density gradient occurs. The fraction of the energy flux transported by convection is not fixed. It varies from 0 to almost 1. A mixing length proportional to the density scale height is used and the results for the sun are compared with previous computations. In no case is there an inversion of the density gradient.

Further computations are made using mixing lengths proportional to the pressure and temperature scale heights. Inversion of the density gradient occurs in some, but not all, cases.

Cosmic Ray Electron Spectrum in a Disk-Halo Galactic Model.

R. F. O'CONNELL AND SABATINO SOFIA, *Institute for Space Studies*.—The theoretical problem of the cosmic ray electron spectrum in the energy range 1–300 BeV in a homogeneous disk-halo galactic model is considered, for the purpose of interpreting recent observational measurements. By allowing the disk and halo particles to interact only through leakage processes, and making use of available data regarding the geometry of the galaxy, it is concluded that, contrary to some published results, the disk-halo model does not lead to a substantial break in the cosmic ray electron spectrum at a critical energy of about 6 BeV, being in this sense hardly distinguishable from a no-halo galaxy. Consequently, within the framework of this model, the data can only be fitted with values of the spectral index γ of about 2.5.

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Structure of the Barnard Loop Nebula as Determined from Gemini 11 Photographs. C. R. O'DELL, DONALD G. YORK, AND KARL G. HENIZE, *The Yerkes Observatory and Dearborn Observatory*.—Ultraviolet objective-prism photographs in the 2200–4900 Å